

JView

Requirements

Thor Design Panel 3

84K-01800-050

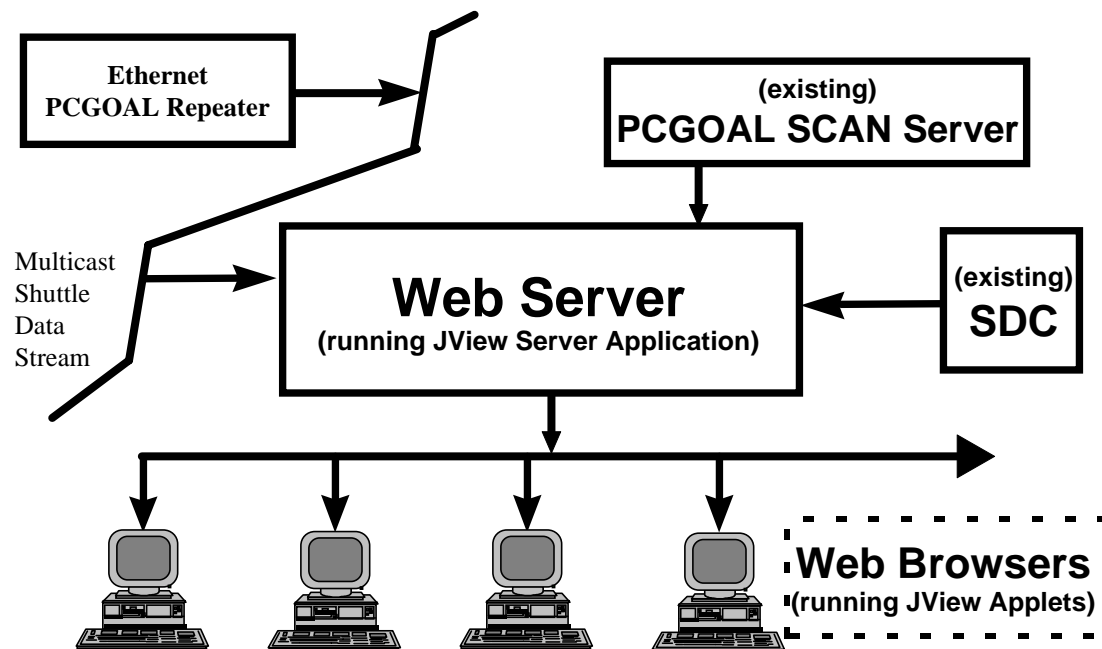
October 30, 1997

Version 1.4

1.0 JView Introduction

1.1.1 JView Overview

The JView system provides a display interface to a variety of shuttle data streams in a fashion similar to the existing PCGOAL application (but running as a window in a desktop environment). The primary function of JView is the display of measurement values on user desktop computers via JAVA-enabled Web-browsers. These values are viewed by the user from graphical display screens (initially, PCGOAL DSP skeletons) and plot screens. As a “monitoring only” system, JView is not intended to replace or conflict with existing or planned checkout and firing room applications.



1.1.2 JView Operational Description

JView allows users from a Web browser on their office desktop workstation to connect to a data server, select a data stream, and activate static-background and plot-window displays. For Thor, up to 100 concurrent users will be able to run JView applets and access near real-time shuttle measurement data. Based on performance and usage data gathered during this period, a full-scale deployment strategy will be established enabling JView to support the entire user community (estimated at 800 KSC based users).

The JView application is composed of two main subsystems. The JView server subsystem is responsible for communicating with a variety of data sources, acting as an information and executable archive for JView clients, delivering requested data to client applications and providing security (username/password verification) functions. Performance information on the number of clients, the data throughput rate, and the number of DSPs being supported are compiled on a continuous basis. For the Thor deployment, the JView server will reside on a Silicon Graphics/O2 system located in TRM-039.

User computers which run JView display functions are called JView clients. As currently envisioned, each JView client will run a JView applet (a JAVA program which runs within a JAVA enabled Web browser) to provide client functionality. However, performance and network requirements (such as access to multicast data) may require that these client programs also be downloadable as JAVA applications for client machines. This decision will be largely

determined by performance comparisons between prototype JView applications and applets and how well the new Java Development Kit (JDK) 1.1 compliant browsers support multicast communications.

While active, JView clients support user requests to display selected static-background displays, plot desired FDs and manage alarm, display, and plot options. Upon startup, a JView client establishes a connection to a JView server and downloads required FD information, FD measurement and initialization data. Once the client is initialized and all current data values have been received, the JView client enters a “listen” mode where it periodically receives data change values from the server. The client periodically acknowledges its status to the server and notifies the server of any significant configuration changes. In addition, the client can also request that the server gather historical data values from the Shuttle Data Center (SDC) server. Note, for the Thor deployment, JView will be using the Shuttle Data Stream (SDS) that only contains CCMS data.

1.2 JView Specifications

1.2.1 JView Groundrules

- All software development toolsets and COTS software will be baselined to support the JAVA standard release JDK 1.1 from Sun Microsystems.
- JView print capability will be dependent on available and supported network printers (and functionality provided by COTS Browsers).
- For the Thor deployment, JView receives setup information from existing PCGOAL offline and standalone applications. For example, BLD files are used to create the list of valid DSP displays and the list of valid FDs.
- For the Thor deployment, JView requires access to the following three data sources for CCMS measurement data:
 - A multi-stream PCGOAL SCAN Server
 - The SDC (for historical Quick Plot data)
 - A “SDS Prime” multicast data stream

1.2.2 JView Functional Requirements

The Functional Requirements for JView are arranged in the following major/minor functions:

1. Supported Tool Sets
2. Supported Environments
3. Supported Data Interfaces
4. Main Screen Graphical User Interface (GUI)
5. Static Background Display Views
6. Graph/Plotting Display Views
7. Performance Statistics
8. Help Displays

1 Supported Tool Sets

- 1.1 JView software shall be developed using Symantec’s Visual Café Java IDE (Integrated Development Environment), version 1.1 or higher.
- 1.2 JView shall be executed using a fully “JDK 1.1 compliant” web browser (e.g. Netscape Navigator 4.0 or better, Microsoft’s Internet Explorer 4.0 or better, or Sun’s HotJava 1.0 or better).

2 Supported Environments

- 1.1 JView shall execute on the CLCS Support Workstation.
- 1.2 JView shall execute on the Office Workstation.

3 Supported Data Interfaces

JView shall use CCMS data as described in Table 1 below.

	CDS CCMS Historical	SDC CCMS Historical	SDC CLCS Historical	SDS CCMS Real-time	SDS' CCMS et al Real- time	SCAN Server CCMS Real-time	SDS CLCS Real-time
Display			*	✓	✓	✓	*
Plot		✓	*	✓	✓	✓	*
Display - Static Background Displays Plot - Graph/Plotting Displays <div style="float: right;"> ✓ = Thor * = Future </div>							

Table 1 — JView Data Sources (Support for Thor)

4 Main Screen Graphical User Interface (GUI)

- 1.1 JView shall allow user to Logon and Logoff.
- 1.2 JView shall provide to the user the ability to activate Graph/Plotting Display Views.
- 1.3 JView shall provide to the user the ability to activate Static Background Display Views.
- 1.4 JView shall provide a scrollable text area for the user to monitor status and error messages.
- 1.5 JView shall allow the user to clear the scrollable text area.
- 1.6 JView shall display messages or indicators to inform the user of communication and downloading status.
- 1.7 JView shall provide to the user the ability to Exit the program.

5 Static Background Display Views

- 1.1 JView Static Background Display shall allow the selection of the TCID.
- 1.2 JView Static Background Display shall allow the selection of the Static Background source file (DSP).
- 1.3 JView Static Background Display shall allow the selection of the data source (SDS or SCAN Server).
- 1.4 JView Static Background Display shall allow the display of up to 400 FDs per window.
- 1.5 JView Static Background Display shall allow the display of detailed information on a selected FD.
- 1.6 JView Static Background Display shall allow designation of a specific displayed FD for plotting.
- 1.7 JView Static Background Display shall reflect changes to displayed FD values as they occur.
- 1.8 JView Static Background Display shall indicate the time and date of displayed data.
- 1.9 JView Static Background Display shall indicate the TCID of displayed data.
- 1.10 JView Static Background Display shall indicate the DSP name of the selected Static Background Source file.
- 1.11 JView Static Background Display shall provide to the user the ability to Exit.
- 1.12 JView Static Background Display shall indicate FD status via background colors.

6 Graph/Plotting Display Views

- 1.1 JView graph/plot screen shall allow the selection of the TCID.
- 1.2 JView graph/plot screen shall allow the selection of the data source (SDS, SCAN Server, or Historical).
- 1.3 JView graph/plot screen shall allow the selection of up to 6 valid Function Designators (FDs) available in a particular data stream to be plotted simultaneously.

- 1.4 JView graph/plot screen shall provide to the user the ability to plot Real-time data (measurements vs time) and Historical data.
- 1.5 JView graph/plot screen shall allow the selection of Start / Stop time and Dates for Historical data retrieval requests.
- 1.6 JView graph/plot screen shall provide the capability for auto-scaling of data results.
- 1.7 JView graph/plot screen shall provide the capability for user scaling of data results.
- 1.8 JView graph/plot screen shall indicate the time and date of displayed data.
- 1.9 JView graph/plot screen shall indicate the TCID of displayed data.
- 1.10 JView graph/plot screen shall indicate the FD names of displayed data.
- 1.11 JView graph/plot screen shall provide to the user the ability to Exit.

7 Performance Statistics

- 1.1 JView server shall display the number of active clients.
- 1.2 JView server shall display the overall client data rate (FDs/sec).
- 1.3 JView server shall display the number of enabled data streams.
- 1.4 JView server shall display the overall data stream data rate (FDs/sec).
- 1.5 JView server shall display of SDC archive request usage/performance.

8 Help Display Views

- 1.1 JView shall provide On-Line Help on all main displays.
- 1.2 JView may use a combination of Popup displays and/or HTML documents to display help information to the user.

1.2.2.1 Future JView Requirements and Ideas

Future Requirements for JView may include some of the following:

- 1. User labeling of graphic plots.
- 2. Support for 800 KSC-based users (multiple servers & client multicast support)
- 3. Additional graphical/plotting functionality.
- 4. Support for Sherrill Lubinski generated displays.
- 5. Support for CLCS real-time and historical data.
- 6. Extended printing capabilities.
- 7. Integration of existing PCGOAL tools (such as GOALEDIT and BUILD).
- 8. Providing FD selection from a scrollable list that reacts to keystrokes.
- 9. Utilization of user configuration and/or preference files.
- 10. JView access from other NASA Centers and off-site locations.
- 11. Out of tolerance alarm monitoring.

1.2.3 JView Performance Requirements

For the Thor deployment, the JView user community will consist primarily of users who are KSC resident and their desktop computers are connected to 10mbs or faster Ethernet networks. For these users, the following performance parameters apply.

1 Client Performance

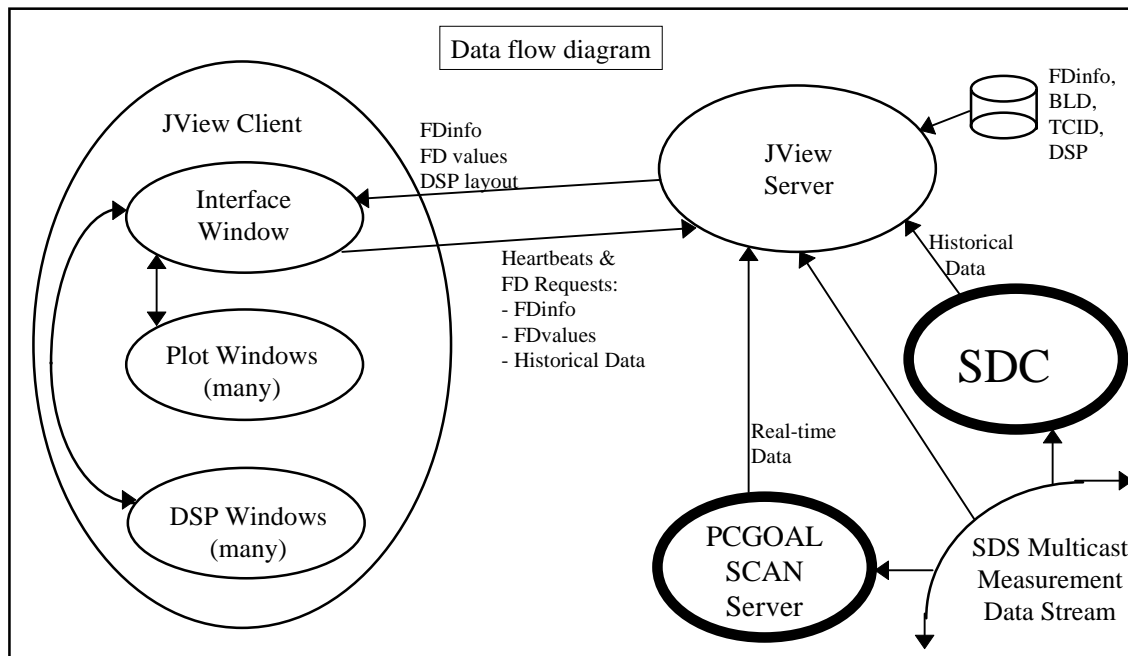
- 1.1 JView client displays shall update at in a two second or less refresh rate.

2 Server Performance

- 2.1 The JView server shall make available to JView clients a minimum of three Shuttle Data Streams simultaneously. *JView has a performance target of support for 100 clients per JView server.*

1.2.4 JView Flow Diagram

When executed via a Web browser such as Netscape Navigator, Microsoft Explorer, or Sun Microsystems' Hot Java, an applet containing the JView client is downloaded from the JView server system into the users computer. The browser then executes the downloaded byte code which brings up the JView client management interface. From this screen, the user will initiate primary client functionality such as login, logout, DSP display, and Plot display. In addition, the user can monitor client operations, inspect client performance, and be advised of any network concerns.



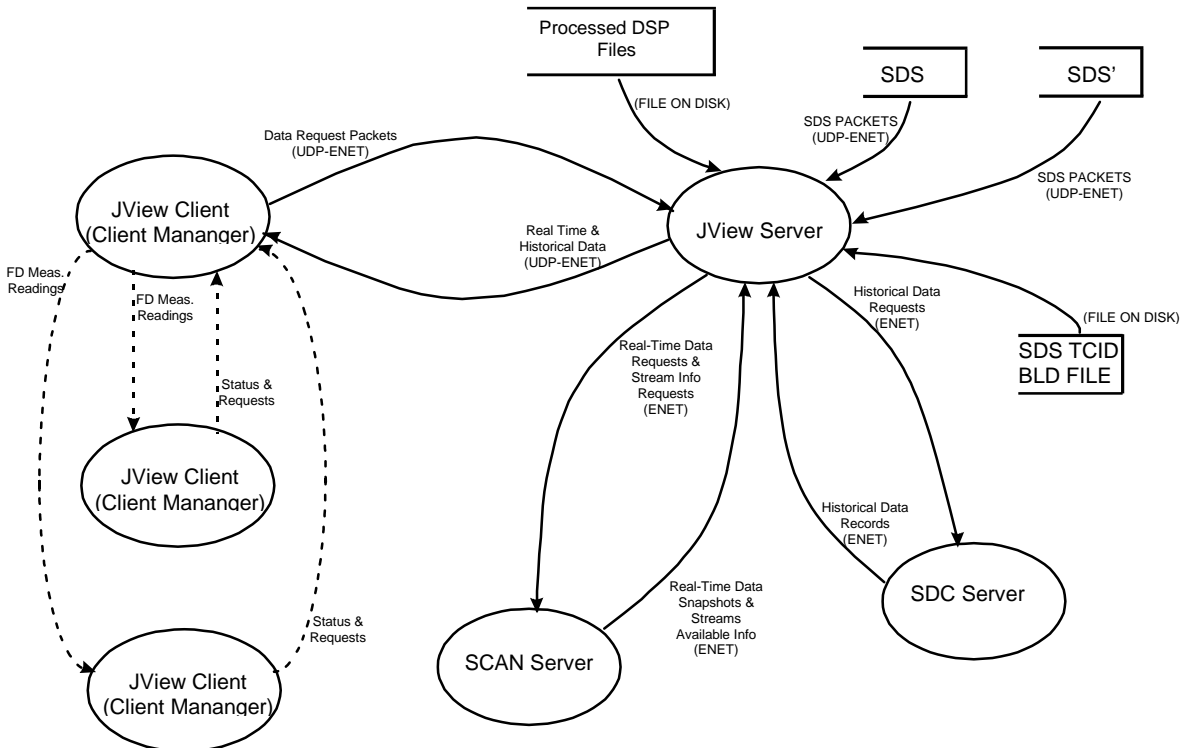
1.3 JView Design Specification

JView shall be implemented under a classical client/server architecture. While the JView client runs on the user machine and handles all direct user I/O, the JView server acts as a back-end data collector and information provider.

1.3.1 JView Detailed Data Flow

This data flow diagram provides a pictorial representation of the data flow between external sources and destinations and the major and minor functions of JView.

JView Detailed Data Flow Diagram



1.3.2 JView External Interfaces

1.3.2.1 JView Message Formats

The following System Messages are output by JView.

Message Number = 1

Message Group = Client

Severity = Error

Date/Time: **Config Couldn't get Internet address: Unknown host**

Help Information Content:

Client was unable to connect to Host because of invalid IP address.

Message Number = 2

Message Group = Client

Severity = Informational

Date/Time: New Stream List: #I1#

Insert #1 = Listing of all currently available Shuttle Data Streams

Help Information Content:

Display of latest list of currently available Shuttle Data Streams.

Message Number = 3

Message Group = Client

Severity = Informational

Date/Time: #I1#thread Started on port : #I2#

Insert #1 = Thread name

Insert #2 = Local port number

Help Information Content:

Thread startup log entry.

Message Number = 4

Message Group = Client

Severity = Informational

Date/Time: Heartbeat sent to server

Help Information Content:

Record of periodic heartbeat messages sent to server.

Message Number = 5

Message Group = Client

Severity = Warning

Date/Time: #I1#thread Message Reply Timeout

Insert #1 = Thread name

Help Information Content:

UDP message lost, client retries transmission

Message Number = 6

Message Group = Client

Severity = Warning

Date/Time: #I1#Thread Message Transmission Error

Insert #1 = Thread name

Help Information Content:

Thread unable to confirm server receipt of message after several retries.

Message Number = 7

Message Group = Client

Severity = Informational

Date/Time: Server Message : #I1#

Insert #1 = Message that was sent from the server

Help Information Content:

Server desires that client display this message to user.

Message Number = 8

Message Group = Client

Severity = Error

Date/Time: #I1#Thread Error on port : #I2#

Insert #1 = Thread name

Insert #2 = Local port number

Help Information Content:

Thread unable to establish network connections to required port

Message Number = 9

Message Group = Server

Severity = Warning

Date/Time: **Invalid client number received from : #I1#**

Insert #1 = Internet address of client

Help Information Content:

Server received invalid client number from computer at this network address.

Message Number = 10

Message Group = Server

Severity = Warning

Date/Time: **Status Bar Veto Exception**

Help Information Content:

Server unable to update main screen status bar.

Message Number = 11

Message Group = Server

Severity = Informational

Date/Time: **New Client Recognized at : #I1#**

Insert #1 = Internet address of client

Help Information Content:

A new user has successfully logged in from this Internet address.

Message Number = 12

Message Group = Server

Severity = Warning

Date/Time: **Data Error: Buffer too small to be PCGoalPacket**

Help Information Content:

Error in communicating with the SCAN server.

Message Number = 13

Message Group = Server

Severity = Error

Date/Time: **ScanServer Error: #I1#**

Insert #1 = ASCII description of error that occurred

Help Information Content:

Error in communicating with the SCAN server.

Message Number = 14

Message Group = Server

Severity = Error

Date/Time: **StreamChecker Error: UnknownHostException**

Help Information Content:

JView server unable to establish communications with the SCAN server.

Message Number = 15

Message Group = Server

Severity = Informational

Date/Time: **Stream configuration complete: #I1#**

Insert #1 = New Stream Name

Help Information Content:

A new stream has been enabled for monitoring by the JView server.

Message Number = 16

Message Group = Server

Severity = Informational

Date/Time: **#I1#Thread Started on port : #I2#**

Insert #1 = Thread name

Insert #2 = Local port number

Help Information Content:

Thread startup message.

Message Number = 17

Message Group = Server

Severity = Error

Date/Time: **#I1# Error: SocketException on socket open**

Insert #1 = Thread name

Help Information Content:

Unable to open a socket for required network communications.

Message Number = 18

Message Group = Server

Severity = Error

Date/Time: **#I1# Error: SocketException on timeout set**

Insert #1 = Thread name

Help Information Content:

JAVA error on initializing a network message timer.

Message Number = 19

Message Group = Server

Severity = Error

Date/Time: **#I1# Error: IOException on write**

Insert #1 = Thread name

Help Information Content:

JAVA reported a network error during a “send” operation.

Message Number = 20

Message Group = Server

Severity = Error

Date/Time: **#I1# Error: IOException on read**

Insert #1 = Thread name

Help Information Content:

JAVA reported a network error during a “receive” operation.

Message Number = 21

Message Group = Server

Severity = Error

Date/Time: **#I1# DatagramSocket Connection Failure**

Insert #1 = Thread name

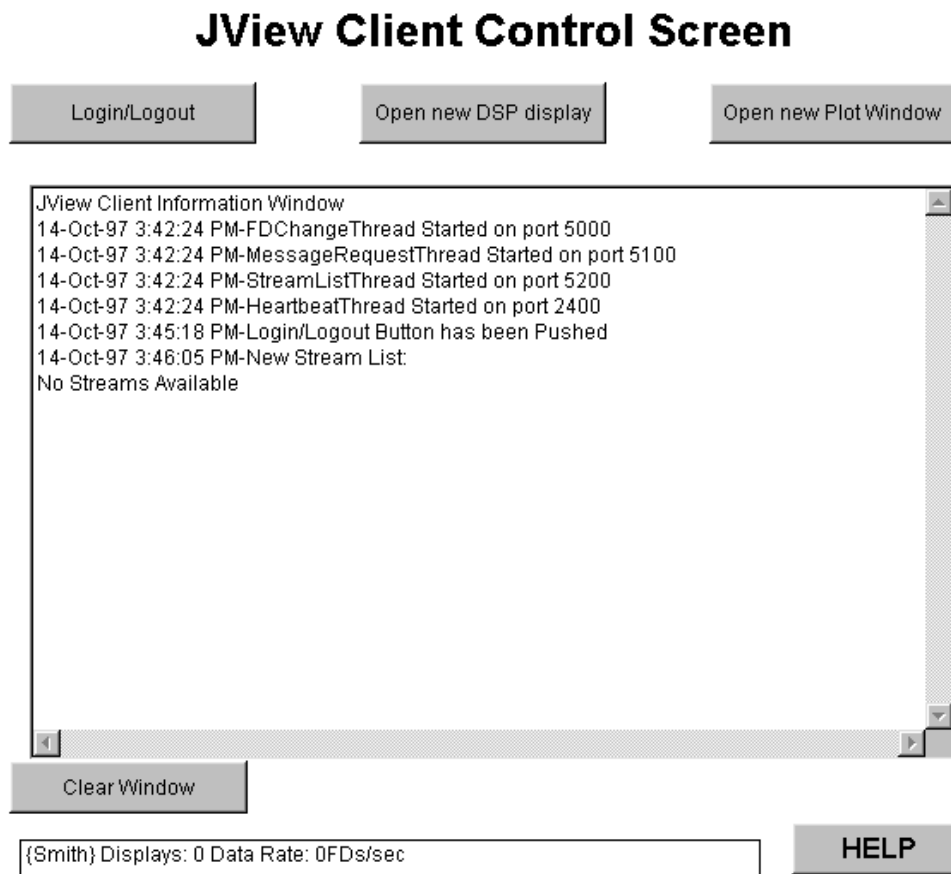
Help Information Content:

Unable to open a socket for required network communications.

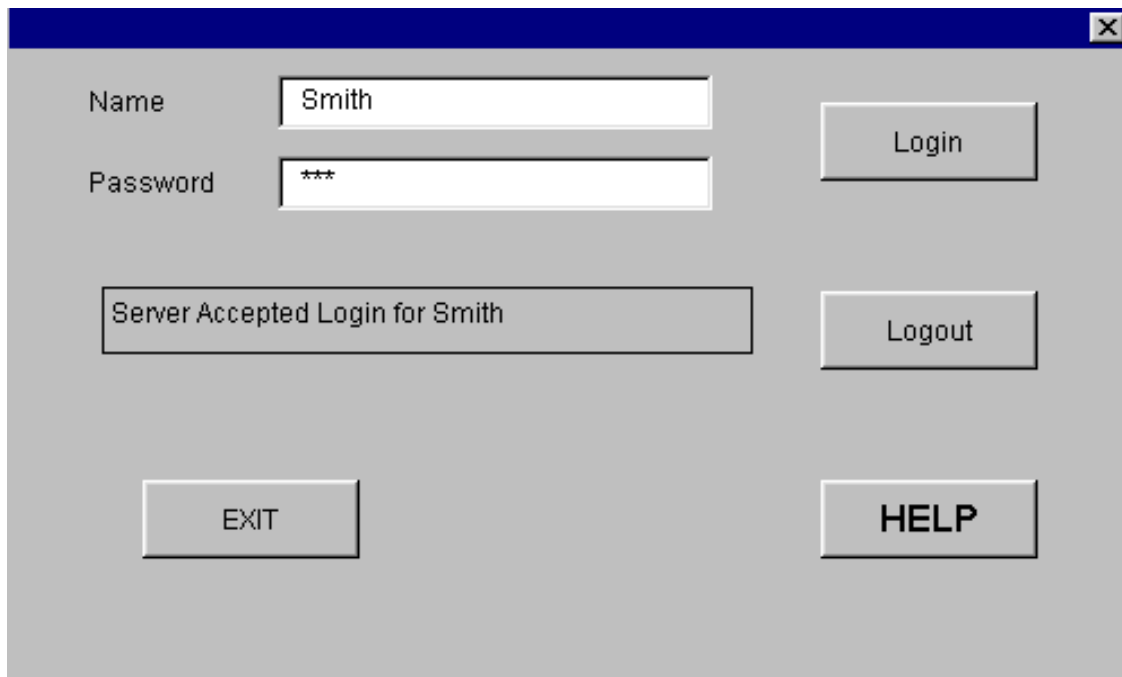
1.3.2.2 JView Display Formats

The following Displays are produced by JView.

Client Main:



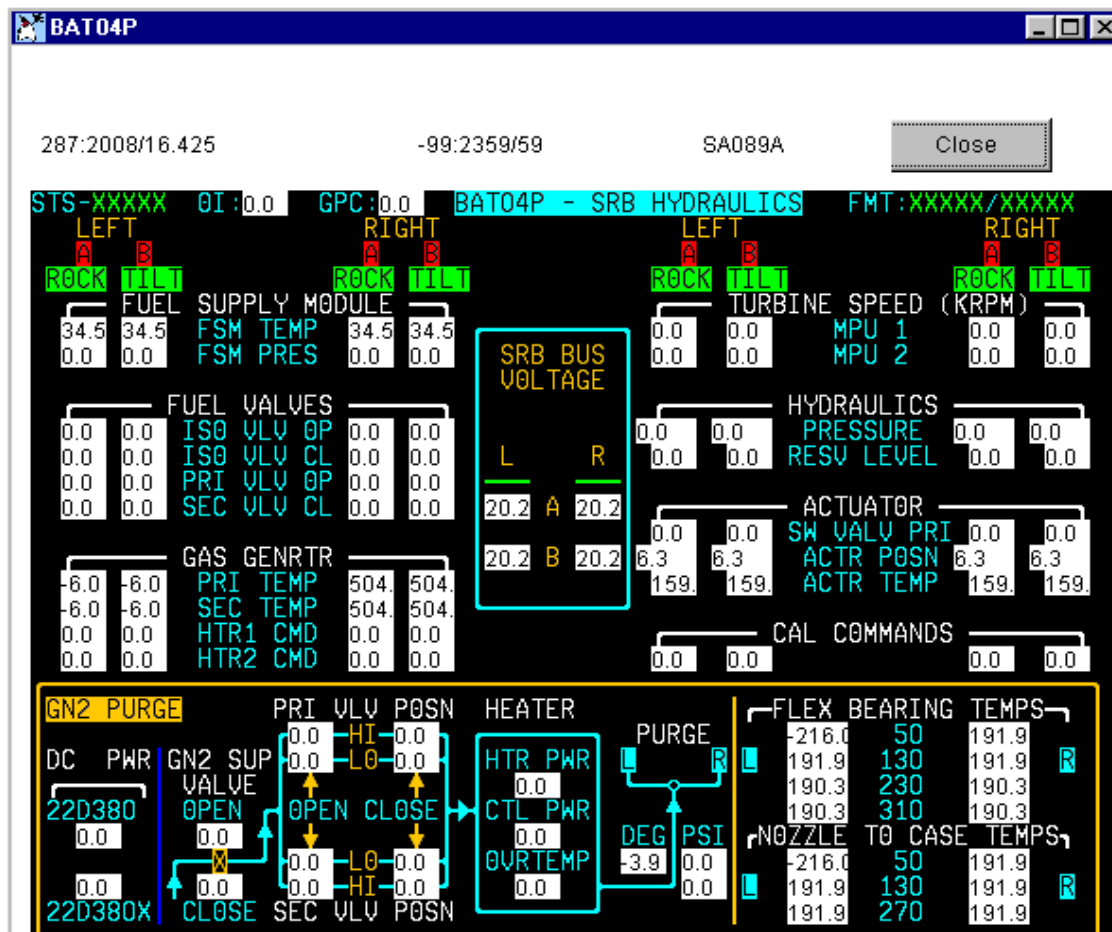
Client Logon/Logoff:



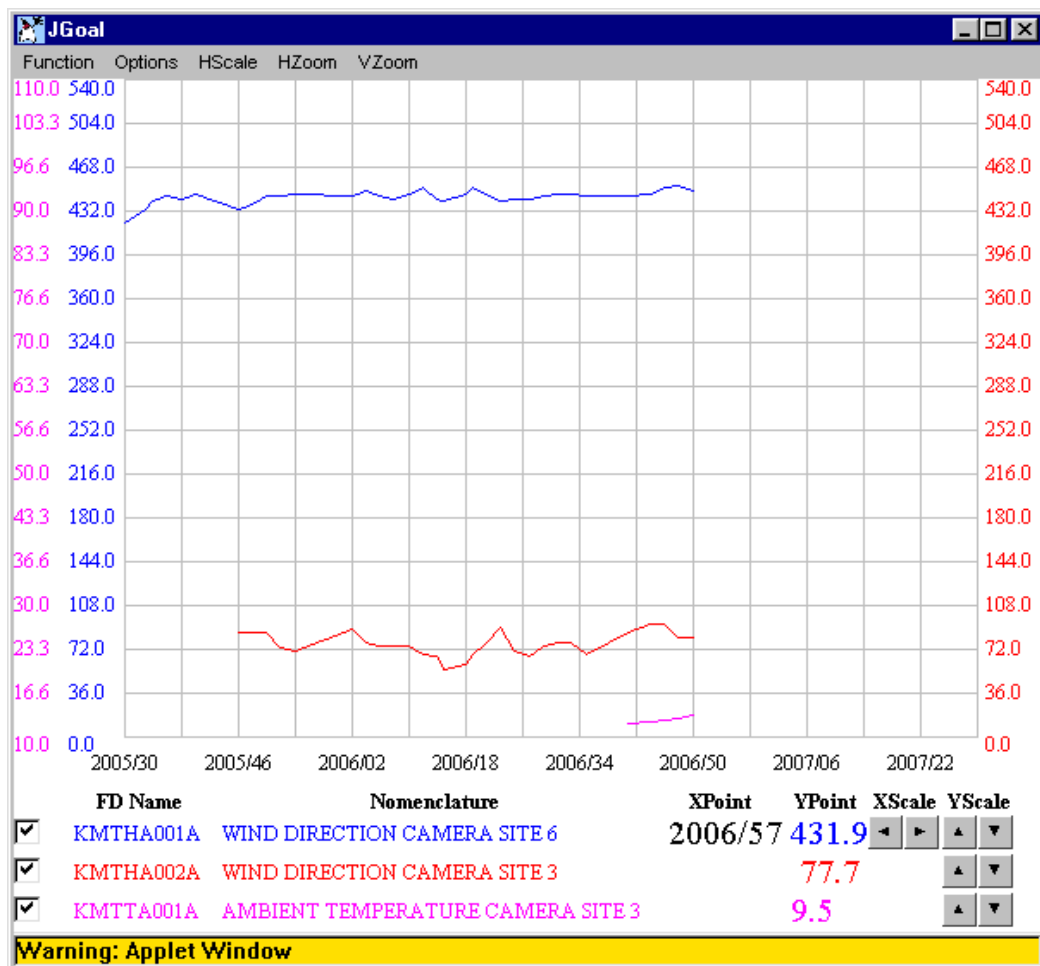
A screenshot of a 'Client Logon/Logoff' dialog box. The window has a dark blue title bar with a close button (X) in the top right corner. The main area has a light gray background. It contains two input fields: 'Name' with the text 'Smith' and 'Password' with three asterisks '***'. To the right of these fields is a 'Login' button. Below the 'Name' field is a text box containing the message 'Server Accepted Login for Smith'. To the right of this text box is a 'Logout' button. At the bottom left is an 'EXIT' button, and at the bottom right is a 'HELP' button.

Name	Smith	Login
Password	***	
Server Accepted Login for Smith		Logout
EXIT		HELP

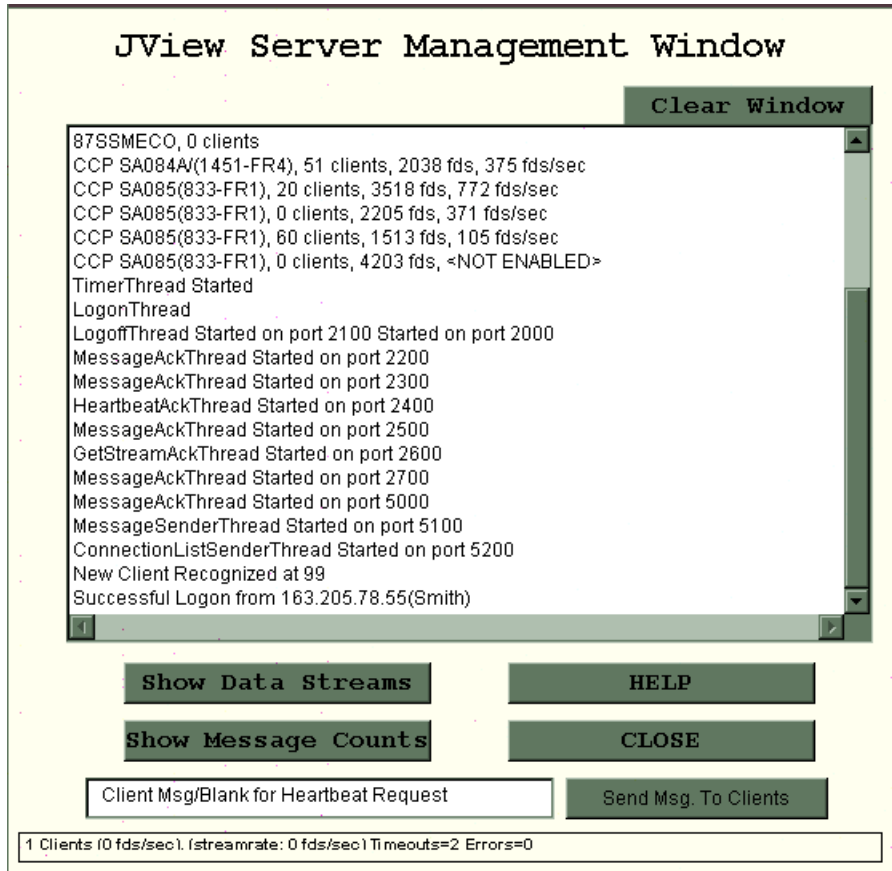
Client DSP:



Client Plot:



Server Main:



1.3.2.3 Input Formats

There are no input formats for JView.

1.3.2.4 Recorded Data

There is no recorded data for JView.

1.3.2.5 JView Printer Formats

There are no printer formats for JView.

1.3.2.6 Interprocess Communications

The following messages are transmitted between the JView Server process and one or more JView Client processes. These messages are transmitted using the User Datagram Protocol (UDP) for speed and efficiency and therefore implement their own error checking mechanisms.

CLIENT MESSAGE TO SERVER: LOGON-REQUEST

ascii name (20 chars), password (20 chars)

Response: ACK, Client#(short) / NAK (*invalid user/password*) / BUSY (*too many users*)

CLIENT MESSAGE TO SERVER: LOGOFF-NOTIFICATION

Client#(short)

Response: ACK / NAK (*if not logged on*)

CLIENT MESSAGE TO SERVER: SET-MONITORED-FD-LIST

Client#(short), Screen#(short), TCID (string),

flag (short) = 0 (when display has exited)

= -x (next x characters is the display name *<future>*)

= +x (followed by x FD numbers (shorts))

Response: ACK (*invalid stream/fd errors are reported to the server status window*)

CLIENT MESSAGE TO SERVER: RESEND-ALL-FD-VALUES-REQUEST (*typically sent after data error*)

Client#(short)

Response: ACK

CLIENT MESSAGE TO SERVER: HEARTBEAT (*sent on request from server from port 5100*)

Client#(short), # of data timeouts(short) , # of data errors (short)

CLIENT MESSAGE TO SERVER: HISTORY-REQUEST (*NOTE: maybe implement as a RMI on the server*)

Client#(short), Screen#(short), TCID (string),

fd's (short), fd-list (shorts), start/end time

Response: set of {number of values (short), list of timestamp/raw counts value pairs}

CLIENT MESSAGE TO SERVER: GET-STREAM-AVAILABILITY-LIST (*at startup or after data error*)

Client#(short)

Response: ACK (*actual response is broadcast back to client on port 5200*)

CLIENT MESSAGE TO SERVER: FDINFO-REQUEST (*Note, client will cache FDInfo data*)

Client#(short), #fd's (short), fdlist (shorts), TCID

Response: set of fdinfo strings (string)

(*invalid fd errors are reported to the server status window*)

SERVER MESSAGE TO CLIENTS: FD-UPDATE,

(*sent once per update cycle for fds in SET-MONITORED-FD-LIST*)

MaxServerStreams*(GMT (long), CDT (long)),

of display updates (byte),

(for each display update)

display # (byte),

of fds (short),

list of fd updates (fd pointer (short), raw counts (short)),

msg count (short)

SERVER MESSAGE TO CLIENTS: SERVER-MESSAGE,

msg (max 80 bytes) (*message to be displayed to the client's user*)

(*if msg=null, the client should generate a HEARTBEAT and send to server.*)

SERVER MESSAGE TO CLIENTS: STREAM-AVAILABILITY-LIST *(sent on request by client or when list changes)*
stream list (string), msg count (short)

1.3.2.7 External Interface Calls

Ethernet SCAN Server communication protocols are documented in the PCGOAL source file “SCANSERV.C”.

Multicast Ethernet protocols of PCGOAL repeater programs are documented in the PCGOAL source files “ENETPCG1.C” and “ENETPCG2.C”.

Communication protocols with the SDC are documented in the SDC User Data Server User Guide (SDC-SYS-UG-01).

1.3.2.8 JView Table Formats

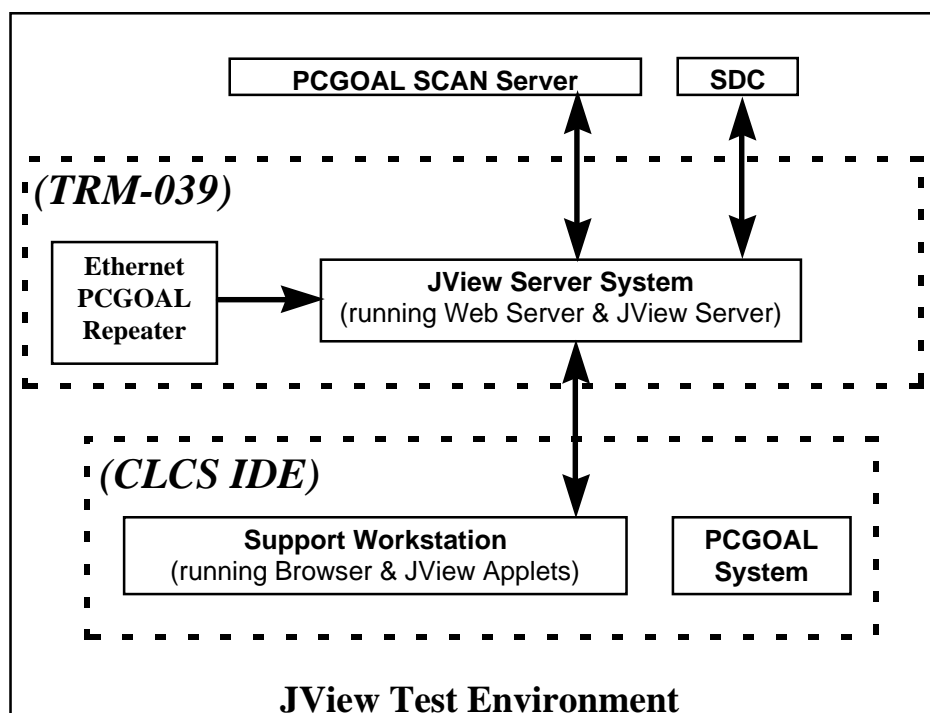
The format for BLD files is documented in Appendix G of the PCGOAL User Guide (KSCL-1100-0806 and in Appendix B of the PCGOAL Design Specification (KSCL-1100-0805).

The format for DSP files is documented in Appendix G of the PCGOAL User Guide (KSCL-1100-0806 and in Appendix B of the PCGOAL Design Specification (KSCL-1100-0805).

1.3.3 JView Test Plan

1.3.3.1 Test Environment

While JView is designed to run on a wide variety of computer platforms with Java-enabled COTS browsers (JDK 1.1 compliant), integrated testing will occur from a terminal in the CLCS IDE. For verification of displayed data, a PCGOAL terminal will also be present. Following a written test procedure, the IDE computer will connect to a SGI system residing in TRM-039 (running a Web Server and the JView Server application) and begin exercising JView functions. Testing will be witnessed by a minimum of one Dynacs representative, one Quality representative, and one CSCI lead.



1.3.3.2 Hardware/Software Configuration

1. PCGOAL SCAN Server - PC running DOS and PCGOAL SCAN Server software (provides snapshot SDS/SDS' data).
2. Ethernet PCGOAL Repeater - PC running DOS and PCGOAL Repeater software (provides Multicast SDS/SDS' data).
3. PCGOAL System - PC running DOS and PCGOAL client software (for displayed data verification)
4. SDC - DEC running UNIX and DRD software (provides historical plotting data).
5. JView Server System - SGI/O2 running UNIX, JView server software, and Web server software.
6. Support Workstation - PC running Windows 95, JDK 1.1 compliant Web Browser, and JView client software.

1.3.3.3 Test Cases

During the following tests, application generated and JVM (Java Virtual Machine) messages shall be monitored for warnings and errors. Also user reactions to the "look and feel" of the client interface will be evaluated.

1. Performance - Verify two second screen update speed and calculate maximum client support capabilities (*JView target of support for 100 clients per server*). Monitor loading speed to start JView and start Plot and Static Background displays.
2. Reliability - Monitor length of time between significant system errors or restarts.
3. Fault tolerance - Verify JView's ability to handle invalid data (network interruptions, abnormal exits, and data source changes or faults).
4. Accuracy - Verify correctness of displayed data using PCGOAL terminal.
5. Completeness - Demonstrate that JView fully implements the functional and data source access requirements established in this document.

Appendix A

Data Analysis and Presentation Data Sources (Support for Thor)

	CDS CCMS Historical	SDC CCMS Historical	SDC CLCS Historical	SDS CCMS Real-time	SDS' CCMS et al Real- time	SCAN Server CCMS Real-time	SDS CLCS Real-time
RCWI	✓	✓	* FD only				
ADAT		✓	✓				
RDP		* FD only	✓				
PAT		✓	*	✓	*		*
JView		✓	*	✓	✓	✓	*
ANNT		✓	*	✓	*		*
<p>RCWI - Robust CAP Web Interface ADAT - Advanced Data Analysis Tool RDP - Retrieved Data Presentation PAT - Propulsion Advisory Tool JView - JView (Java Version of PCGOAL) ANNT - APU Neural Net Tool</p> <p>* indicates potential future supported data source.</p>							